



## **Wireless Power Transmission (WPT): Charger For Internal Battery Of Bio Medical Instruments**

**Awill Anurag Misra**

Deptt. Of Electronics & Communication Engg.  
B. N. College of Engineering & Technology  
Lucknow, U.P. – 226021, India

**Sarita Misra**

Deptt. of Electronics & Comm. Engg.  
Maharana Pratap Engineering College,  
Kanpur, U.P.-209217, India

***Abstract:***

*Wireless power transmission (WPT) is a circuit which is used to send electricity from one point to another. Its not only allow us to to send signals but also to add or drop voltages at the reciver end. The analysis in this paper will be based largely on osscillators and inductors. In this paper we present the transmission of (HT)high level signal ( $10^4V$ ) upto 1m distance and more this is a possibility. WPT is a method to send electricity in the form of magnetic flux. There is a big challenge for scientist to convert voltage into another format and send it to some distance without any medium. Use of oscillators and inductor can generate a huge amount of flux when applied in the circumstances of voltage of 11000V.which easily fall on another sequential inductor so that the gap between is maintained and EMF generates induced on the receiver end. It is difficult to make some volts to thousands of volts; however WPT (using HT) do this. Using this there is a possibility to recharge a battery which is transplanted in a human body for artificial heart or for other works*

***Keywords:*** WPT, Oscillator, Inductor, flux, HT( $10^4V$ ), Artificial Heart, EMF

### Introduction

An electric current flowing through a conductor carries electrical energy. When an electric current passes through a circuit there is an electric field in the dielectric surrounding the conductor; magnetic field lines around the conductor and lines of electric force radiate about the conductor. In an alternating current circuit, the fields also alternate; that is, with every half wave of current and of voltage, the magnetic and the electric field start at the conductor and run outwards into space with the speed of light. Where these alternating fields impinge on another conductor a voltage and a current are induced. Electromagnetic induction is proportional to the intensity of the current and voltage in the conductor which produces the fields and to the frequency. The higher the frequency the more intense the induction effect. Energy is transferred from a conductor that produces the fields (the primary) to any conductor on which the fields impinge (the secondary). Part of the energy of the primary conductor passes inductively across space into secondary conductor and the energy decreases rapidly along the primary conductor.

### Block Diagram For HT

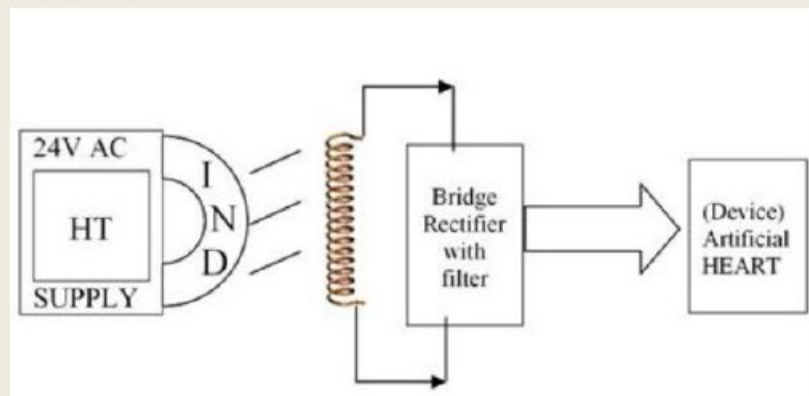


Figure 1a: Block diagram of WPT using HT for charging internal battery of heart.

One can easily buy a T.V kit which can generate High Tension Line of 11000V using the H.T portion only. Send it to a copper based inductor and receive it up to some distance again using an inductor. It can recharge an internal battery of artificial heart as shown in the diagram.



dielectric and foil or foil+film based - other types will heat up and melt in this application. The transmitter still oscillated at relatively high frequency and had to be tuned by insertion of a ferrite core into the loop, as shown on the picture. This lowered the frequency to about 1.5 MHz without load. Alternatively a copper or aluminium plate can be brought near the loop to increase frequency, by decreasing inductance. Number of capacitors was later increased to 8, removing the need of additional tuning.

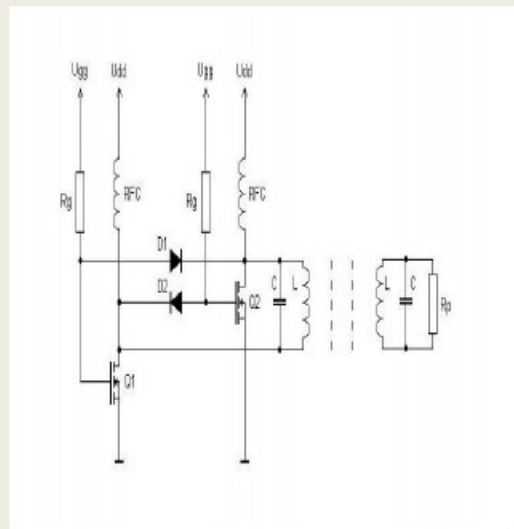


Figure 2: Transmitter and receiver circuit

On the receiver side only a single capacitor and a loop of 3mm solid copper wire was used. The wire heats up significantly; a small matching inductor in series with the load, which is a 24V 5W. It's choice was guessed at 6uH and it improved performance somewhat at larger distances.

### Improvement In Distance

To relate the magnetic flux density  $B$  by magnetic field intensity  $H$  for free space we use

$$B = \mu_0 H, \text{ where } \mu_0 = 4\pi \times 10^{-7} \text{ (permeability)}$$

$\phi$  flux passing through any designated area:

$$\phi = \int_s \mathbf{B} \cdot d\mathbf{s} \text{ wb}$$

$$\text{Self Inductance: } L = (N \phi) / I$$

where  $N$  is the no of turns  $I$  is the current

EMF generated:  $\epsilon = -d\phi/dt$  hence improvement is possible by changing the value of  $\phi$ , B.H and especially turns N.

### **Conclusion**

Many research works are present in the field of electromagnetic for wireless power transmission but WPT is the strong effort in this field. Configure for many applications, cost effective and reliable. The WPT not only sends AC signal up to some distance but also works as a charger for Artificial Heart.

This paper concludes that the wireless power transmission is implemented and also used for the charging of battery especially for medical field. Therefore it can easily used for many field not only for medical but also for the typical cases where there is no medium or wireless medium required to receive voltage.

**Reference**

1. G. A. Landis, "Applications for Space Power by Laser Transmission," SPIE Optics, Electro-optics & Laser Conference, Los Angeles CA, 24–28 January 1994; *Laser Power Beaming, SPIE Proceedings Vol. 2121, 252–255*.
2. Buley, Taylor (9 January 2009). "Wireless technologies are starting to power devices, 01.09.09, 06:25 pm EST". *Forbes*. Retrieved 4 June 2009.
3. Systems of Transmission of Electrical Energy, U.S. Patent No. 645,576, March 20, 1900.
4. POINT-TO-POINT WIRELESS POWER TRANSPORTATION IN REUNION ISLAND 48th International Astronautical Congress, Turin, Italy, 6–10 October 1997 – IAF-97-R.4.08 J. D. Lan Sun Luk, A. Celeste, P. Romanacce, L. Chane Kuang Sang, J. C. Gatina – University of La Réunion – Faculty of Science and Technology.
5. SYSTEM OF TRANSMISSION OF ELECTRICAL ENERGY, 2 Sept. 1897, U.S. Patent No. 645,576, 20 Mar. 1900.
6. Nikola Tesla On His Work With Alternating Currents and Their Application to Wireless Telegraphy, Telephony and Transmission of Power
7. Henry Bradford, "Tesla on Global Wireless Energy Transmission for Telecommunications and Other Purposes"